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Moe's Scale of Hardness with the Rockwell, Brinell, and Scleroscope Scales.

Inaugural Thesis
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Moe's scale of hardness as used in mineralogy is admittedly rather indefinite and no exact hardnesses are measured. The Rockwell, Brinell, and Scaleroscope machines give quite definite results which may be easily reproduced at any time. The purpose of this investigation is to determine wheather any definite relation exists between Moe's hardness and the hardness as measured by those machines commonly used for the determination of hardness of metals. If such a relation were found it would provide a more definite and accurate measure of the hardness of minerals.

In 1884 Pfaff(1) measured hardness of Moe's scale by boring, with a standard drill point and a fixed pressure, a given depth in each mineral. The number of drill revolutions was counted in each case, then corundum was taken as 1000 and the results of the others arranged preportionally. In 1892 Rosiwalt(1) made similar measurements using a certain surface area and grinding to a given depth. Again corundum was taken as 1000 and the results extrupolated accordingly. In 1897 Jaggar(1) made a similar comparrison on athe basis of an instrument he divised and called a microsclerometer. The results of these three differ widely as may be seen by table 1. The results of Pfaff however closely approach a logarthmic curve and will therefore be usedin comparison to results obtained by Rockwell, Brinell, and Scaleroscope.

(1) Rock Minerals Iddings Page 85.

Procedure

The minerals used in Moe's scale were obtained in as pure a form as possible. Smooth level surfaces were prepaired by grinding and pollishing. The minerals thus prepaired were measured for hardness in the Rockwell, Brinell, and Scaleroscope machines. The results thus obtained are shown in fig.2 and table 2

Conclusion

No one hardness machine was found applicable over the whole range, though each showed ranges where the hardness followed closely the logarithmic curve aproximated by the measurements of Pfaff. We conclude therefore that none of the devices used are applicable to the measurement of Moe's hardness since they measure greatly different properties from those measured by Moe's scale of hardness. To find any definit relation between the minerals of moe's scale it would be necessary to find some device measuring the same properties as Moe's scale or some property directly preportional to these.

Table 1

	Pfaff	Rosiwalt	Jaggar
Corundum	1000	10000	1000
Topaz	459	138	152
Quartz	254	149	0.40
Orthoclase	191	28.7	25
Apatite	53.5	6.20	1.23
Flurâte	37.3	4.70	0.75
Calcite	15.3	2.68	0.26
Gypsum	12.03	.34	0.04

Table2

	Scalroscope	Brinell	Rockwell
Corundum	26.5	____	____
Topaz	72	____	100
Quartz	64.915	____	120
Orthoclase	64	____	____
Apatite	46	751	54
Flurite	40	468	___
Calcite	25.5	224	49
Gypsum	9	78	___
Talc	5	48	___

Figure 1.

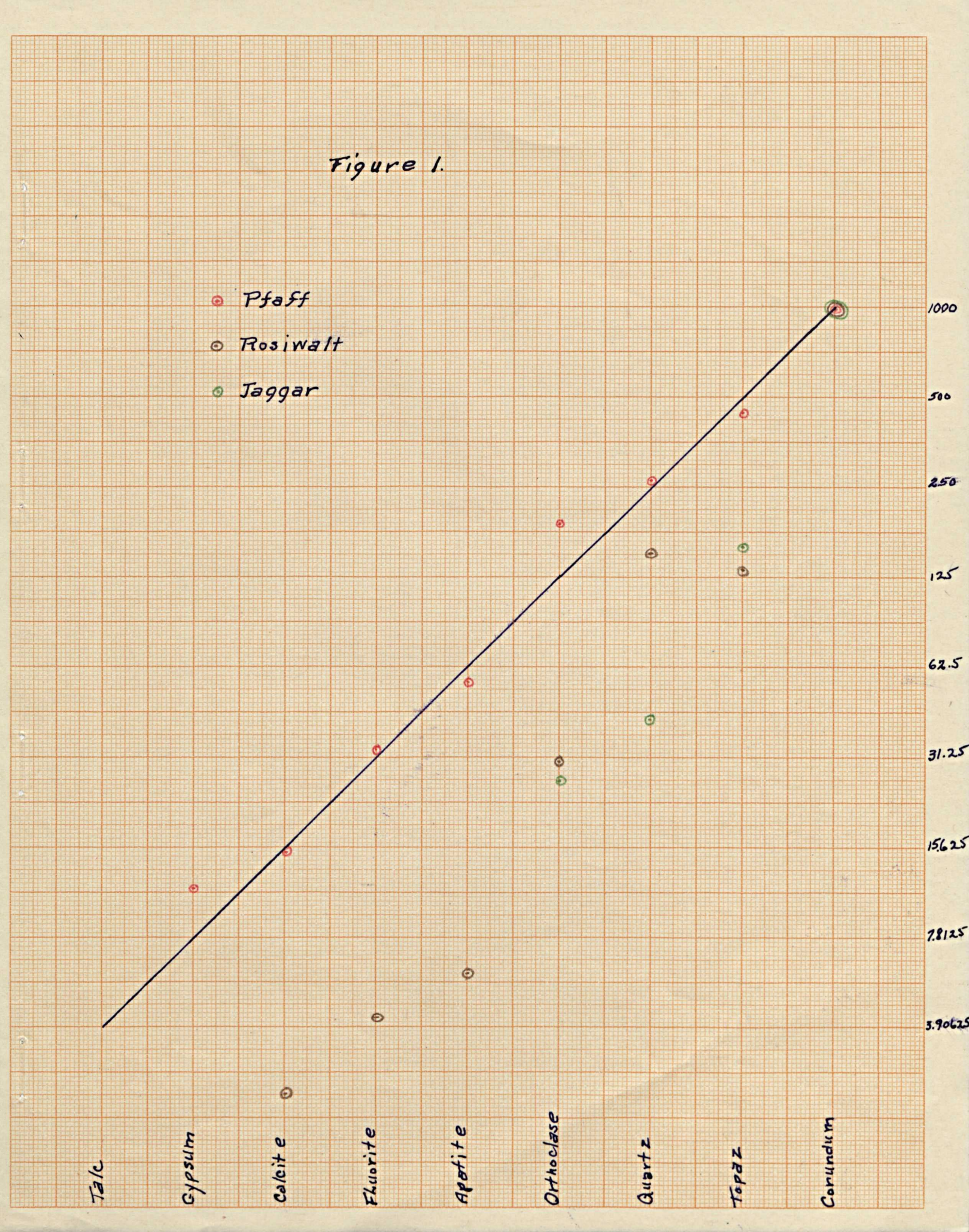
Pfaff
Rosiwalt
Jaggar
1000
500
250
125
62.5
31.25
15.625
7.8125
3.90625
Talc
Gypsum
Calcite
Fluorite
Apatite
Orthoclase
Quartz
Topaz
Corundum

Figure 2


Scleroscope
Brinell
Rockwell
128
80
800
64
40
400
32
20
200
10
100
5
50
Talc
Gypsum
Calcite
Fluorite
Apatite
Orthoclase
Quartz
Topaz
Corundum

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